——— AND J.A. SIMONETTI. 1987. Predator/prey relationships among terrestrial vertebrates: an exhaustive review of studies conducted in southern South America. *Rev. Chil. Hist. Nat.* 60:221–244.

JOHNSON, A.W. 1965. The birds of Chile and adjacent regions of Argentina, Bolivia and Perú. Vol. 1. Platt Establecimientos Gráficos, Buenos Aires, Argentina.

LONNBERG, E. 1921. The birds of Juan Fernández Island and Easter Islands. Pages 19–24 *in* C. Skottsberg (ED.), The Natural History of Juan Fernández and Easter Island. Vol. III. Almquist & Wiksells, Uppsala, Sweden.

RAU, J.R., M.C. VILLAGRA, M.L. MORA, D.R. MARTÍNEZ AND M.S. TELLERÍA. 1992. Food habits of the Short-eared Owl (*Asio flammeus*) in southern South America. *J. Raptor Res.* 26:35–36.

ROTTMANN, J. AND M.V. LÓPEZ-CALLEJAS. 1992. Estrategia nacional de conservación de aves. Servicio Agrícola y Ganadero, División de Protección de los Recursos Naturales Renovables, *Ser. Téc.* 1:1–16.

SÁIZ, F. 1982. Proposición de un método de control integrado del conejo en el Archipiélago de Juan Fernández. Univ. Católica de Valparaíso, Valparaíso, Chile.

SCHLATTER, R.P. 1987. Conocimiento y situación de la ornitofauna en las islas oceánicas chilenas. Pages 271–285 *in* J.C. Castilla (ED.), Islas oceánicas chilenas: conocimiento científico y necesidades de investigación Ediciones Univ. Católica de Chile, Santiago, Chile.

———, J.L. YÁÑEZ AND F.M. JAKSIĆ. 1980. Food-niche relationships between Chilean Eagles and Red-backed Buzzards in central Chile. *Auk* 97:897–898

STUESSY, T.F., C. MARTICORENA, R. RODRÍGUEZ, D.J. CRAWFORD AND O.M. SILVA. 1991. Endemism in the vascular flora of the Juan Fernández Islands. *Aliso* 13: 297–307.

TORRES, D. 1987. Antecedentes sobre el lobo fino de Juan Fernández *Arctocephalus philippii* y proyecciones para su estudio. Pages 287–317 *in* J.C. Castilla (ED.), Islas oceánicas chilenas: conocimiento científico y necesidades de investigación. Ediciones Univ. Católica de Chile, Santiago, Chile.

TORRES, D. AND A. AGUAYO. 1971. Algunas observaciones sobre la fauna del Archipiélago de Juan Fernández. *Bol. Univ. Chile* 12:26–37.

Received 8 February 1993; accepted 1 June 1993

J Raptor Res. 27(3):169–171

OBSERVATIONS OF WINTERING GYRFALCONS (*FALCO RUSTICOLUS*) HUNTING SAGE GROUSE (*CENTROCERCUS UROPHASIANUS*) IN WYOMING AND MONTANA U.S.A.

CHRISTOPHER S. GARBER
Wyoming Natural Diversity Database, The Nature Conservancy, 3165 University Station, Laramie, WY 82071 U.S.A.

BRIAN D. MUTCH
The Peregrine Fund, Inc., 5666 West Flying Hawk Lane, Boise, ID 83709 U.S.A.

STEPHEN PLATT
Wyoming Department of Environmental Quality, 250 Lincoln St., Lander, WY 82520 U.S.A.

Little has been written on the prey preferences of wintering Gyrfalcons (*Falco rusticolus*) outside of their breeding range (Palmer 1988, Dobler 1989, Sanchez 1993). Most summaries of Gyrfalcon prey selection are from data collected during the breeding season (Sherrod 1978). Although wintering Gyrfalcons occur within the range of Sage Grouse (*Centrocercus urophasianus*; Cade 1982, Johnsgard 1983), we found no reports of wild Gyrfalcons preying upon this species. However, captive Gyrfalcons flown in falconry are reported to be able to kill Sage Grouse (Christopher and Hardaswick 1988).

Between 8 November and 6 December 1992, CSG and SP observed an individual Gyrfalcon on 10 separate days (identification was based on comparisons of photographs) 14 km east of Lander, Wyoming. The Gyrfalcon appeared to be an adult female based on its plumage, yellow feet,

and large size (Cramp and Simmons 1980, Cade 1982). Habitat in the area is primarily shrub-steppe dominated by sagebrush (*Artemisia tridentata*) and mixed grasses. The area is a major wintering site for Sage Grouse; CSG and SP frequently observed several hundred Sage Grouse in an area which measures about 8 km^2. On 5 December 1992, we observed three hunting flights by this Gyrfalcon at Sage Grouse within a 0.5 hr period. All three flights originated from fenceposts in the same area. All flights were of the "direct pursuit" type typically used by Gyrfalcons (Cramp and Simmons 1980, Cade 1982, Palmer 1988).

On the first flight, the Gyrfalcon flew directly to a strip of sagebrush about 200 m distant, and then landed on the snow and walked in small circles amongst the sagebrush for about 1 min as if searching for prey. CSG then walked to the area and flushed the Gyrfalcon and a Sage Grouse which had been hiding in the immediate area. The Gyrfalcon flew directly back to its initial perch on the fencepost.

About 10 min later, the Gyrfalcon flew back to the same general area and flushed five Sage Grouse from a strip of short sagebrush by repeatedly making shallow dives at them. It then chased one of the Sage Grouse, and then a second, but ceased pursuit of both Grouse after minimal effort and returned to its perch. Ten min later, the Gyrfalcon flew back to the same area and flushed another Sage Grouse. It chased it vigorously for about 275 m until the Sage Grouse escaped by entering a strip of tall sagebrush. The Gyrfalcon again returned to its previous perch. At this point, we left the area and ended the observation.

During the winter of 1992, BDM observed two adult female Gyrfalcons (based on appearances) hunting and successfully capturing Sage Grouse in Montana. Again, habitat in these areas was predominantly sagebrush shrub-steppe.

The first Gyrfalcon BDM observed was perched on a fencepost 60 km southwest of Dillon, Montana, on 29 January 1992. When BDM flushed a large flock of Sage Grouse, the Gyrfalcon immediately pursued the flock for about 350 m until it killed one. BDM later observed the Gyrfalcon eating the grouse.

On 7 February 1992, BDM observed what was believed to be another individual Gyrfalcon 11 km west of Dillon, Montana. During this observation, BDM did not see the Gyrfalcon until it appeared in pursuit of a lone Sage Grouse which he had flushed. The Gyrfalcon quickly caught up to the Sage Grouse, and by approaching it from below and slightly ahead, cut it off from escape cover. The Gyrfalcon then quickly climbed about 5 m and caught the grouse. BDM later observed the Gyrfalcon eating the captured Sage Grouse.

Our repeated observations of Gyrfalcons residing in Sage Grouse wintering areas, the observation of several hunting flights of Gyrfalcons at Sage Grouse, and the absence of other suitable prey indicates that these Gyrfalcons may have been using Sage Grouse as a primary prey. This should not be considered atypical since Gyrfalcons are well known for their dependence on gallinaceous birds as primary prey during the breeding season. For example, Rock Ptarmigan (*Lagopus mutus*) and Willow Ptarmigan (*Lagopus lagopus*) can sometimes represent over 90% of the diet by weight (Cramp and Simmons 1980).

Our observations help support the limited data which suggests that Gyrfalcons wintering outside of their breeding range establish hunting areas where large concentrations of avian prey are present, such as Rock Doves (*Columba livia*), ducks (Anatidae), Canada Geese (*Branta canadensis*), Sharp-tailed Grouse (*Tympanuchus phasianellus*), and Greater Prairie-Chickens (*Tympanuchus cupido*; Dobler 1989, Sanchez 1993, Garber pers. obs., and P.A.B. Widener Jr. pers. comm.), are present.

While a few larger prey have been recorded as being captured by Gyrfalcons (Cramp and Simmons 1980), the weight of an adult Sage Grouse is definitely at the upper weight limits of prey reported to have been captured. The weight of a Sage Grouse is substantial (2010–3266 g for males and 1142–1754 g for females; Patterson 1952, Johnsgard 1983) when compared to that of a Gyrfalcon (805–1300 g for males and 1400–2100 g for females; Cade 1982). We did not determine the sex of the Sage Grouse which were pursued or captured by Gyrfalcons during our observations.

RESUMEN.—Se registraron tres observaciones separadas de *Falco rusticolus* cazando *Centrocerus urophasianus,* en Wyoming y Montana, E.E.U.U. De cinco intentos de caza observados, dos resultaron exitosos. Todas las observaciones fueron realizadas en áreas usadas por grandes bandadas de *C. urophasianus*.

ACKNOWLEDGMENTS

The authors would like to thank Mike Britten, Richard Cotter, and Dick Dekker for reviewing this manuscript. We would also like to thank P.A.B. Widener Jr. for comments and suggestions.

LITERATURE CITED

CADE, T.J. 1982. The falcons of the world. Cornell Univ. Press, Ithaca, NY U.S.A.

CHRISTOPHER, K.L. AND V. HARDASWICK. 1988. Gyrfalcons and sage grouse hawking. Pages 263–270 *in* H. Webster and J. Enderson [EDS.], Game hawking at its very best. Windsong Press, Denver, CO U.S.A.

CRAMP, S.K. AND E.L. SIMMONS (EDS.). 1980. Handbook of the birds of Europe, the Middle East and North Africa. Vol. II. Oxford Univ. Press, London, U.K.

DOBLER, F.C. 1989. Winter Gyrfalcon (*Falco rusticolus*) habitat utilization in Washington. Pages 61–70 *in* B.-U. Meyburg and R.D. Chancellor [EDS.], Raptors in the modern world. Proc. III World Conf. Birds Prey, Eilat, Israel.

JOHNSGARD, P.A. 1983. The grouse of the world. Univ. Nebraska Press, Lincoln, NE U.S.A.
PALMER, R.S. [ED.]. 1988. Handbook of North American birds, Volume 5, Diurnal raptors, Part 2. Yale Univ. Press, New Haven, CT U.S.A.
PATTERSON, R.L. 1952. The Sage Grouse in Wyoming. Sage Books, Inc., Denver, CO U.S.A.
SANCHEZ, G.H. 1993. The ecology of wintering Gyrfalcons (*Falco rusticolus*) in central South Dakota. M.S. thesis, Boise State Univ., Boise, ID U.S.A.
SHERROD, S.K. 1978. Diets of North American Falconiformes. *Raptor Res.* 12(3/4):49–121.

Received 31 March 1993; accepted 1 June 1993

J. Raptor Res. 27(3):171–172

TRAPPING TECHNIQUES FOR BREEDING COOPER'S HAWKS: TWO MODIFICATIONS

ROBERT N. ROSENFIELD
Department of Biology, University of Wisconsin, Stevens Point, WI 54481 U.S.A.

JOHN BIELEFELDT
Park Planning, Racine County Public Works, Sturtevant, WI 53177 U.S.A.

Bloom et al. (1992) have shown that use of a Great Horned Owl (*Bubo virginianus*) as a live decoy provides an effective trapping technique for breeding raptors of many different species, including Cooper's Hawk (*Accipiter cooperii*). They did not, however, address the problem of retrapping the same Cooper's Hawks in later years with the same technique, i.e., the difficulty of recapturing "trap-shy" individuals (Bloom 1987). Indeed, mention by Bloom et al. (1992) of several Cooper's Hawks recaptured over a 4-yr period, apparently with the same type of trap, suggests no such difficulty with this species. As part of our long-term research using decoy owls in mark-recapture studies of breeding Cooper's Hawks (Rosenfield et al. 1992), we have encountered many trap-shy individuals. Here we present two trap modifications to overcome this problem.

Great Horned Owl Set. The typical trap consists of a lure owl tethered by a swivel and leash to a perch within 0.5 m of the ground near a nest with nestling hawks present; a mist net or *dho-gaza* is erected within 1–2 m of the owl. Hereafter this design is called the "typical set." Our modification of this technique places the decoy in an elevated set well above ground level. During 1980–86, at >30 active nests where we had captured one or both of the breeding birds, the typical set did not elicit stoops by the resident hawks in a subsequent year. Often the hawks would not even approach the decoy. We suspected that these trap-shy birds would be more likely to stoop at the owl if it were placed closer to the nest and thus appeared to be a greater threat to the nestling hawks. To test this speculation, we placed a live owl within 1 m of the ground near an active Cooper's Hawk nest where three previous visits using the typical set had failed to elicit stoops. We simultaneously placed a stuffed Great Horned Owl about 10 m from the ground on a pole erected within 2 m of the live owl. During the next 20 min (while the lower owl repeatedly moved about and jumped from perch to ground and back up to the perch), the adult female Cooper's Hawk stooped at and struck the stuffed owl five times, but did not stoop at the lower owl. We returned 2 d later and erected a mist net within 1 m of the stuffed owl, which was again placed 10 m high. We captured the adult female within 5 min following set-up. It was a bird caught with the typical set in the previous year.

This elevated set (from 10–13 m off the ground) has worked successfully at four other sites where previous visits in the same year with the typical set had failed to catch the hawks. In all instances we caught one or both adults within 10 min of trap set-up, and all were recaptures of birds originally caught with the typical set in a previous year. Lure birds at these four sites were a stuffed Barred Owl (*Strix varia*), a stuffed Rough-legged Hawk (*Buteo lagopus*), a stuffed Great Horned Owl, and a live Great Horned Owl, respectively. The live owl was tethered on a very short leash (about 3 cm) which would not allow it to leap from the perch.

This elevated set took 2 hr to set up in one instance and 0.5–1 hr in other cases depending on how many tree branches had to be cleared for a net lane. Suspending the net from tree trunks took at least two people—one climber and an assistant on the ground to hand up materials. The decoy was perched atop a horizontal pole braced on tree branches. We strongly recommend that at least one trapper remain hidden near the elevated set to ensure the safety